PROCEEDINGS OF LEARNED SOCIETIES.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—MEETING HELD AT CAMBRIDGE.

Section of Zoology and Botany.

June 19, 1845.—The Rev. Professor Henslow in the Chair.

The following are abstracts of the principal communications laid before the Section.

The first paper read was a Report by Dr. Richardson "On the Ichthyology of China."

Till within a recent period little was known of Chinese fishes. Linnæus was acquainted with about a score of Japanese fish; and a few were afterwards added to the list by Langsdorff, who accompanied the Russian admiral, Knesenstiern, in his voyage to the Isles of Japan and the South Sea. With these exceptions, the fish of the eastern coasts of Asia, from the sea of Ochotsic down to Cochin China, were till very recently known to European naturalists only from Chinese and Japanese drawings, several collections of which are to be found in the Paris and British libraries. Yet the fish of the coasts of China are abundant, and the fisheries extensive and important. Materials for the description of these fishes were not wanting. Mr. John Reeves had beautiful coloured drawings, mostly of the size of life, made of no fewer than 340 species of fish which are brought to the markets in Canton. Copies of these drawings now exist in the British Museum. Some fishes have been recently sent from Chusan; other Chinese fishes have been described in the account of the voyage of the Sulphur. A collection of 100 fishes made at Canton exists in the museum of the Philosophical Society of Cambridge. From these and other recent sources the present report was drawn up. The author concluded from his researches, that the existence of chains of islands or of continuous coast having an east and west tendency promotes the range of a species or of a group of species. Thus, to take the intertropical zone of the ocean, we find very many fish common to the Red Sea, the coasts of Madagascar, the Mauritius, the Indian Ocean, the southern parts of China, the Philippines, the whole Malay Archipelago, the north coasts of Australia, and the entire range of Polynesia, including the Sandwich Islands. In the generic forms of its freshwater fish, China agrees closely with the peninsula of India. If we could suppose the extensive belt above alluded to, enclosing more than two-thirds of the circumference of the globe, to be suddenly elevated, we should find the remains of fish scattered over it to be everywhere very nearly alike; the species having a local distribution being comparatively few and unimportant. These spoils of fish would of course, in accordance with the observation of Prof. E. Forbes, be associated with very various assemblages of mollusks and other marine animals, according to the depth at which the deposit took place. This was an important fact for the science of geology.

" On a new genus of *Mollusca Nudibranchiata*." By Messrs. Alder and Hancock.

This new genus is founded on the *Tritonia arborescens* of authors and its allies, which are distinguished from the true *Tritoniæ* (*T. Hombergii*, &c.) by the form of their tentacula, and the free, arborescent nature of their branchiæ. These characters alone induced the authors to consider them generically distinct before they had an opportunity of examining their internal structure, in which such important differences in the digestive organs were exhibited as to show that this new genus, for which the name of *Dendronotus* is proposed, should be removed from the family *Doridæ* to that of *Eolidæ*, to be placed first in order, as the connecting link between these two families.

" On the Cilia and Ciliary Currents of the Oyster." By the Rev. J. B. Reade.

The author stated that in a microscopic investigation of infusoria which had for some years occupied his attention, he had been led particularly to notice the beautiful contrivance by which many species, when not exerting their powers of locomotion, are supplied with food. When they are examined under the microscope by such an arrangement of transmitted light as makes the infusoria luminous points on a perfectly dark field, it is immediately seen that the action of the cilia attached to their tentacula produces a strong current in the water, and hereby a countless number of minute living organisms is brought within the influence of the cilia, and a sufficient supply is selected for food. Thus with respect to infusoria it is a known fact, that the absence of the prehensile organs possessed by larger creatures is compensated by this delicate but efficient ciliary apparatus. It is also a fact equally well known, that the lips of the oyster which surround the orifice of the alimentary canal are in the same manner fringed with cilia; and that these cilia of the oyster, as of infusoria, equally cause currents in the water. But it has never been suggested and proved by any naturalist, that the proper office of the cilia of oysters is to bring to these acephalous mollusks that food which they have no power to follow or to seize. Such however, without doubt, is the case; and accordingly an examination of the contents of the stomachs of oysters discovers to us their infusorial food; and after undergoing the process of digestion in the stomach, the siliceous shields of these infusoria, deprived of their organic and carbonaceous integuments, are ejected as effete matter. In a paper communicated last year to the Microscopical Society of London, on animals of the chalk still found in a living state in the stomachs of oysters, these infusoria were described and enumerated. The apparent identity existing between these recent living infusoria and the fossil makes the inquiry of considerable interest to the geologist; for the addition of this connecting link to the chain of organized beings extends a continuous line of the same organic structure from the secondary formation to the tertiary, and seems to preclude the supposition of Prof. Phillips, that below the tertiary formation are no recent species. Whether or not this conclusion be admitted, it is a fact, ascertained by pursuing this inquiry, that the oysters and other bivalves, which are

innumerable in the Kimmeridge clay, lived, like recent oysters, upon infusoria; and consequently the conclusion is unavoidable, that the Kimmeridge clay, like the chalk, contains a considerable per-centage of these minute and indestructible bodies which the microscope discovers in it, and is not the mere comminuted detritus of more ancient and unorganized materials. With these facts established, we may still further conclude from analogy, that a similar ciliary apparatus and similar infusorial food were common to the still earlier bivalves in the seas of the transition formation; and we may then ask,—what right have we, in the absence of a careful microscopic examination of still earlier rocks, to deny the possibility of any portion of their mass being due to the agency of siliceous infusoria?

June 20.—The Rev. L. Jenyns read a paper "On the Turf of the Cambridgeshire Fens."

This turf was not formed by sphagnum, as most peat, but from various species of aquatic plants which had been accumulated for a long period of years above the remains of forest trees which lie buried at the bottom of the moor. There are two distinct kinds of turf, the *upper* and the *lower*. The former is the more compact and heavy of the two; the latter consists entirely of the bark, wood and branches of the submerged trees. The turf is not now rapidly formed, on account of the improved system of drainage. Formerly it was supposed to grow about twenty inches in sixteen years.

Sir R. Schomburgk read a description of the Murichi, or Ita Palm of Guiana. This tree grows from the Llanos of Cumana to the western tributaries of the Rio Negro and the mouth of the Amazon, or over an area of 550,000 square miles. It was called by Father Gumilla the *arbol de la vida*, or tree of life, on account of its various uses. It is of the greatest importance to the inhabitants of the country in which it grows. The trunk and its leaves are used for various household purposes. The sap is a saccharine fluid, much drunk by the natives. The flowers afford a sweet fermentable liquid, resembling champagne. The pith of its trunk affords a kind of sago. Even in its decay this palm is of use, and affords a delicacy to the Indians, which likewise many colonists do not refuse, namely, the larva of a large beetle. The *Curculio palmarum* is found in large numbers in the pith when the trunk is near its decay, and which, when boiled or roasted, resembles in taste the marrow of a beef bone. Its average height is about fifty feet, and it has been observed growing at a height of 3000 to 4000 feet above the level of the sea.

Prof. Allman laid before the Section a monstrosity occurring in *Saxifraga Geum*. The three external verticels of the flowers were normal, but between the stamens and pistil there was developed a series of adventitious carpels crowded upon the margin of a cup-like production which surrounds the lower half of the pistil. These adventitious carpels were characterized by their backs being turned towards the axis of the flower. The carpels bear ovules on their margins, which acquired a very considerable degree of development, becoming completely anatropous, like those in the normal ovary. Dr. Allman explained this monstrosity by supposing the existence of

a series of secondary axes, which are given off in a whorl between the stamens and the primary axis of the flower. These axes terminate in imperfect flowers, of which the additional carpels are the only remains.

Prof. Henslow exhibited a specimen of *Papaver orientale*, in which the filaments of the stamens were converted into bodies bearing ovules.

Prof. E. Forbes read a paper on the Endemic Distribution of Plants.

The hypothesis of the descent of all the individuals of a species either from a first pair or from a single individual, and the consequent theory of specific centres being assumed, the isolation of assemblages of individuals from their centres, and the existence of *endemic* or very local plants, remain to be accounted for. Natural transport, the agency of the sea, rivers and winds, and carriage by animals, or through the agency of man, are insufficient means in the majority of cases. It is usual to say, that the presence of many plants is determined by soil or climate, as the case may be; but if such plants be found in areas disconnected from their centres by considerable intervals, some other cause than the mere influence of soil or climate must be sought to account for their presence. This cause the author proposes to seek in an ancient connexion of the outposts or isolated areas with the original centres, and the subsequent isolation of the former through geological changes and events, especially those dependent on the elevation and depression of land. Selecting the flora of the British Islands for a first illustration of this view, Professor Forbes calls attention to the fact, well-known to botanists, of certain species of flowering plants being found indigenous in portions of that area at a great distance from the nearest assemblages of individuals of the same species in countries beyond it. Thus many plants peculiar in the British flora to the west of Ireland have the nearest portion of their specific centres in the north-west of Spain; others, confined with us to the south-west promontory of England, are, beyond our shores, found in the Channel Isles and the opposite coast of France; the vegetation of the south-east of England is that of the opposite part of the continent; and the alpine vegetation of Wales and the Scotch Highlands is intimately related to that of the Norwegian Alps. The great mass of the British flora has its most intimate relations with that of Germany. The vegetation of the British Islands may be said to be composed of five floras: 1st, a west Pyrenean, confined to the west of Ireland, and mostly to the mountains of that district; 2nd, a flora related to that of the south-west of France, extending from the Channel Isles, across Devon and Cornwall, to the south-east and part of the south-west of Ireland; 3rd, a flora common to the north of France and south-east of England, and especially developed in the chalk districts; 4th, an Alpine flora, developed in the mountains of Wales, north of England and Scotland; and 5th, a Germanic flora, extending over the greater part of Great Britain and Ireland, mingling with the other floras, and diminishing, though slightly, as we proceed westwards, indicating its easterly origin and relation to the characteristic

flora of northern Germany. Interspersed among the members of the last-named flora, are very few specific centres peculiar to the British Isles. The author numbers in ascending order these floras, according to their magnitude as to species, and also, in his opinion, according to their relative age and period of introduction into the area of the British Islands. His conclusions on this point are the following:

1. The oldest of the floras now composing the vegetation of the British Isles is that of the mountains of the west of Ireland. Though an alpine flora, it is southernmost in character, and is quite distinct as a system from the floras of the Scottish and Welsh Alps. Its very southern character, its limitation, and its extreme isolation are evidences of its antiquity, pointing to a period when a great mountain barrier extended across the Atlantic from Ireland to Spain.

2. The distribution of the second flora, next in point of probable date, depended on the extension of a barrier, the traces of which still remain, from the west of France to the south-east of Britain, and thence to Ireland.

3. The distribution of the third flora depended on the connexion of the coast of France and England towards the eastern part of the Channel. Of the former existence of this union no geologist doubts.

4. The distribution of the fourth, or alpine flora of Scotland and Wales, was effected during the glacial period, when the mountain summits of Britain were low islands, or members of chains of islands, extending to the area of Norway through a glacial sea, and clothed with an arctic vegetation, which, in the gradual upheaval of those islands and consequent change of climate, became limited to the summits of the new-formed and still existing mountains.

5. The distribution of the fifth, or Germanic flora, depended on the upheaval of the bed of the glacial sea, and the consequent connexion of Ireland with England, and of England with Germany, by great plains, the fragments of which still exist, and upon which lived the great elk and other quadrupeds now extinct.

The breaking up or submergence of the first barrier led to the destruction of the second; that of the second to that of the third; but the well-marked epoch of migration of the Germanic flora indicates the subsequent formation of the Straits of Dover and of the Irish Sea, as now existing.

To determine the probable geological epoch of the first or west-Irish flora,—a fragment perhaps with that of north-western Spain, of a vegetation of the true Atlantic,—we must seek among fossil plants for a furthermost starting-point. This we get in the flora of the London clay or eocene, which is tropical in character, and far anterior to the oldest of the existing floras. The geographical relations of the miocene sea, indicated by the fossils of the crag, give an after-date certainly to the second and third of the above floras, if not to the first. The epoch of the red or middle crag was probably coeval with the second flora; that of the mammaliferous crag with the third. The date of the fourth is too evident to be questioned; and the author regards the glacial region in which it flourished as a local climate, of which no true traces, as far as animal life is concerned, exist

southwards of his second and third barriers. This was the newer pliocene epoch. The period of the fifth flora was that of the post-tertiary, when the present aspect of things was organized.

Adopting such a view of the relations of these floras in time, the greatest difficulties in the way of changes of the earth's surface and destruction of barriers—deep sea being found where land (probably high land) was—are removed when we find that those greater changes must have happened during the epoch immediately subsequent to the miocene period; for we have undoubted evidence that elsewhere, during that epoch, the miocene sea-bed was raised 6000 feet in the chain of Taurus, and the barriers forming the westward boundary of the Asiatic eocene lakes so completely annihilated, that a sea several hundred fathoms deep now takes their probable place. The changes required for the events which the author would connect with the peculiar distribution of the British flora are not greater than these.

Prof. Forbes maintains that the peculiar distribution of endemic animals, especially that of the terrestrial mollusca, bears him out in these views. He proposes to pursue the subject in detail, with reference both to animal and vegetable life, in connexion with the researches of the geological survey.

June 21.—"Report on the Microscopic Structure of Shells." By W. B. Carpenter, M.D.

This report formed the continuation of last year's on the minute structure of the skeletons of Bivalves and Echinodermata. Dr. Carpenter stated that he had lately examined a recent *Terebratula* preserved in spirits, and ascertained that the perforations in the shell, before described, were filled up in the living animal by membranous cæca, containing cells, forming, as he considered, a glandular apparatus, though its connexion he had not yet been able to trace. He then described the structure of those bivalve mollusks in which the mantle is more or less closed as being generally less characteristic than that of the families already described, their texture being apparently more homogeneous, and the membranous residuum left by the action of acid being less distinct. Frequently, however, traces of a cellular origin were to be seen in shells whose general texture was most homogeneous; sometimes it was seen in the shell, and not in the decalcified membrane, and frequently in the membrane when no traces of it were visible in sections of the shell. Hence Dr. Carpenter felt himself justified in regarding all shells as originating in the secreting action of the cells forming the superficial layer of the mantle; these cells remaining persistent and separate in some cases, whilst in others they coalesced. The peculiar tenacity of the cellular membrane in *Pinna* and its allies was attributed to the presence of an intercellular horny matter, between the true cell-walls; the same substance being elsewhere thrown out upon the surface of the layer as an epidermis or periostracum. Among the shells under consideration in the present report, those of the family *Myadæ* were particularly distinguished by their evident cellular structure; the genus *Pandora*, formerly referred to as one of the most aberrant and

exceptional in the structure of its shell, was now shown to be connected with the surrounding families by *Mya*, *Thracia*, *Anatina*, and other genera of *Myadæ*, whose characters were of an intermediate nature. In the class Echinodermata, Dr. Carpenter extended and confirmed the results he had before given respecting the minute structure of their skeletons, which preserve a remarkable conformity throughout the group, extending to the small calcareous plates met with in the *Holothuridæ*. Dr. Carpenter had also ascertained that the same minute structure existed in the Nummulite with the small existing foraminifera described by Ehrenberg; but that the supposed Nummulites brought by Mr. Pratt from Bayonne presented several forms of structure entirely distinct from that of the true Nummulite.

"On the Sounds produced by one of the *Notonectidæ* under Water." By Mr. Ball.

He stated, that the fact having been mentioned to him some two years since, he had not had an opportunity of testing the observation until within the last few days, when a specimen was brought to him in an ordinary jelly-glass; it was, he believed, the *Corixa affinis*. When suspended in the water, about four inches below the surface, it emitted three short chirrups, and then a long cricket-like sound. It appears the sounds are emitted in the evening and night, and are so loud that they may be heard in an adjoining room, and are continued during the night. Mr. Ball stated that time did not permit him to make any accurate observation; but he thought the matter so curious, that he noticed it with the view of attracting the attention of entomologists, in the hope of obtaining an explanation of the manner in which this noise is produced under water.

"On the Scientific Principles on which Classification in the higher Departments of Zoology should be based." By Mr. Ogilby.

The dental system was, no doubt, a valuable means of diagnosis, and this depended upon the fact that it had a relation to the stomach and other viscera intended for the digestion of food. Just in the same way, the extremities of the mammalia, more particularly the fore-arm, are the exponents of the habits, mental power and œconomy of animals. The fore-arm is the seat of the function of locomotion, of manipulation and touch. According to the real position of an animal in the scale of organization will be the character of its fore-arm. This position was illustrated by examples from the various families of mammalia. He thought, that in our usual systems of zoology a too exclusive regard had been given to the structure and form of the teeth.

Mr. W. Thompson read a letter from Mr. Alder, dated Salcombe, June 17, 1845, in which the writer stated that he had lately obtained in Torbay at least ten, and perhaps twelve new species of *Mollusca nudibranchiata*, to add to the British fauna. They consist of four species of *Doris*, five or six of *Eolis*, and an animal of an entirely new genus, approaching nearest to *Tritonia*. A singular species of mollusk obtained at the same time, resembling in general appearance the genus *Pelta* of Quatrefages, was noticed in detail.

June 23.—" On the Development of Vegetable Cells." By Mr. A. Henfrey.

The conclusions were as follows:—1. That there is no such thing as the interruption of continuity between the liber and alburnum, called the cambium layer. 2. That the potentiality of the black granules described by Schleiden is not proved, and that the utricle first developed from the so-called cytoblast is not the permanent cell, but the primordial utricle of Mohl, the existence of which in growing tissues seems to be universal. 3. That this primordial utricle is not a layer of mucilage, as stated by Nägeli, but a true membrane. The nucleolus, or central spot of Schleiden's cytoblast, is the germinal point, and is situated on the wall of the primordial utricle. When a new cell is to be formed the nucleolus divides into two, and a corresponding construction of the primordial utricle takes place until it separates into two, a layer of permanent cell-wall substance being meanwhile secreted in this fold from the circumference to the centre, till a complete septum is formed. The lateral walls grow by extension, being moulded on the growing primordial utricle within them. In the nascent cell the primordial utricle is filled with granular matter, which during the subsequent growth of the cell remains aggregated round the nucleolus, and thus gives rise to the appearances whence Schleiden derived his theory of development from a cytoblast.

" On the *Phytelephas Macrocarpa* (Vegetable Ivory or Tagua Plant)." By E. Lankester, M.D.

The author brought this plant under the notice of the Section, as he was enabled to present a drawing of a young plant, which was now growing in the garden of Messrs. Loddiges of Hackney. A fruit also of this plant existed in the British Museum, of which a drawing was exhibited. A remarkable point in the œconomy of this plant was, that the horny albumen of the seed appeared to undergo no change during the process of germination. In the plant at Loddiges', which was now five years old, the seed still remained on the surface of the soil, apparently as hard as ever. In germination the young embryo was carried down by a rhizoma an inch or more long into the earth, and commenced growing at that point. Several analyses of the albumen of the seeds had been made by Payen, Connell, and Baumhauer, and, at the author's request, by Dr. Percy of Birmingham.

Prof. Allman gave a description of the fruit of some of the *Hepaticæ*. In the capsules, he pointed out the existence of spiral cells or vessels which he believed had a hygroscopic power, and that it was by their expansion that the capsule burst.

" On Ergot." By Dr. R. Latham.

Dr. Latham stated his conviction, that ergot was on the increase in this country. When he first began to observe it eight years ago, he found it on only a few plants; he now found it in great quantities. He had collected it altogether from eighteen different species of grasses. It had also increased on the cultivated grain, and he believed that ergot was, at this moment, increasing absolutely and indefinitely. A friend of his attributed its increase to the use of

animal manure, and stated that he had always found the ergot most abundant in the grasses of churchyards.

June 24.—"On the Germination of Plants." By Dr. Lankester.

The author took the following view of the phænomena:—That the only essential process in germination is the growth of the young plant, or embryo. The process of development of the embryo, from primitive cytoblasts developing its tissues, is precisely the same as that of every other part of the plant, and from an identity of structure an identity of function might be inferred. But the ordinary theory of germination gave a different function to the tissues of the embryo. The author regarded the absorption of oxygen, the disengagement of carbonic acid gas and ammonia, as the consequence of the decomposition of the starch and proteine contained in the albumen or perisperm of the seed; and that the growing cells of the embryo appropriated the carbonic acid, ammonia and water, just in the same way as all other cells in the vegetable kingdom.

Mr. Westwood made some remarks on the Honey-Bee.—After shortly noticing the general œconomy of the hive-bee as to the production of queens and the swarming of casts, he contended, from the analogy between the circumstances connected with the latter event and those which accompany the swarming of ants, gnats, white ants, mayflies, &c.,—1st, that the swarming of insects has for its principal object the union of the sexes; 2nd, that from analogy with other insects subject to swarming, it is to be inferred that that species does not differ in this respect from other swarming species; and, 3rd, that it is the newly-hatched, and not the old queen which leads off the swarm.

June 25.—"Notes on the Irish Species of Robertsonian Saxifrages." By Mr. Andrews.

The author having studied the Irish Saxifrages, and compared them with those of the Pyrenees, had come to a different conclusion from Mr. Babington, and believed that there were only two true species in Ireland, the *Saxifraga umbrosa* and the *S. Geum*. The other species described by Mr. Babington in his 'Manual,' he regarded as varieties of one or other of these forms.

ROYAL SOCIETY.

June 19, 1845.—"The Blood-Corpuscle considered in its different phases of development in the Animal Series." By Thomas Wharton Jones, Esq., F.R.S., Lecturer on Anatomy, Physiology and Pathology, at the Charing Cross Hospital.

This paper is divided into three parts: the first relating to the blood-corpuscles of the Vertebrata; the second to those of the Invertebrata; and the last to a comparison between the two. He first describes the microscopic appearances of these corpuscles in different classes of vertebrate animals, beginning with the skate and the frog, and proceeding to birds and mammifera; first in their early embryonic state, and next in the subsequent periods of their growth. He finds in oviparous vertebrata generally, four principal forms of